

DATE: December 15, 2003; **Revised September 11, 2009**

TO: Office of Drinking Water Field Office Staff

THROUGH: J. Wesley Kleene, P.E., Director
Office of Drinking Water

Susan E. Douglas, P.E., Director of Technical Services

FROM: Mitch Childrey, P.E., Leader, Radionuclides Rule Team

SUBJECT: Surveillance and Regulations - Radionuclides Rule Procedures for Beta Particle and Photon Emitters

RELATED: WM 813-Well Development, WM 885-Operation Permit Procedures, Compliance Sampling and Reporting Guidance Manual

Revision Highlights:

Gross Alpha, Radium and Uranium monitoring guidance moved to the Compliance Sampling and Reporting Guidance Manual;
Central Office copies of notification letters eliminated.

Only community waterworks determined to be vulnerable to or have source water contaminated by gross beta and photon emitters, more generally referred to as "manmade radionuclides" are required to monitor for beta and photo emitters.

In order to assess the monitoring requirements of 12VAC5-590-370 of the *Waterworks Regulations* for beta particle and photon emitters for community waterworks, VDH must determine, for waterworks near nuclear material handling facilities, if the waterworks is vulnerable to beta particle and photon emitters or its source water is contaminated by beta particle and photon emitters. The owners of waterworks determined by VDH to be vulnerable to beta particle and photon emitters or having source water contaminated by beta particle and photon emitters must be notified of the determination and of their monitoring requirements for beta particle and photon emitters.

Initially, with implementation of the new rule for existing community sources, VDH evaluated available information on the location of facilities that handle significant quantities of manmade radionuclides or posed an existing or a potential threat to nearby community waterworks, made a vulnerability/contamination determination, and notified each community waterworks owner of the determination. **For new community sources, this determination should be made after the initial site visit following construction as part of the procedures for issuing or amending the waterworks operation permit.**

For the purpose of these evaluations, Zone 1 and Zone 2 are defined as follows:

Surface Water or Surface Water Influenced Groundwater

Zone 1 – within 5 miles of source

Zone 2 – within watershed greater than 5 miles from source

Groundwater

Zone 1 – within 1,000 feet of source

Zone 2 – greater than 1,000 feet from source, but within 1 mile of source

Evaluation criteria to consider in making a determination of vulnerability to beta particle and photon emitters are as follows:

1. Beta particle and photon emitter handling facilities in Zone 1 - Community waterworks with facilities that handle significant quantities of beta particle and photon emitters within Zone 1 of a waterworks source may be considered vulnerable to beta particle and photon emitters. These facilities may include nuclear power facilities, Department of Energy facilities, military bases and others. Small quantities of sealed radionuclide sources are not considered a significant threat to waterworks.

Based on discussions and guidance from the staff of the VDH Radiological Health Program, ODW determined that facilities with NRC licenses that are designated on the NRC license list as FA REQ: Y (financial assurances required) will be considered as a significant beta particle and photon emitter source. A list of facilities with NRC licenses in Virginia that require financial assurances is provided on the ODW server at [Y:\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM872 – Rad Rule\NRC List Reference.pdf](#).

Although military bases are included on the NRC list above, it is recommended that the field office staff discuss this issue with the environmental officer of major military bases which have community waterworks sources within the base or if the base is within Zone 1 of a community waterworks source.

2. Historical Data – Gross beta activity is routinely monitored by DCLS as part of the radionuclide analyses required for all community waterworks. Gross beta activity (less the contribution from potassium) higher than the screening level (50 pCi/L) may indicate vulnerability or contamination from man-made sources not otherwise identified.
3. Geology and Hydrology - Consideration should be given to increasing the vulnerability distance from Zone 1 for specific geology or hydrology characteristics (e.g. karst formations) which may increase the potential for source water contamination from beta particle and photon emitter handling/contaminated sites due to short circuiting or high porosity in the groundwater aquifer.
4. Location of National Priority List facilities identified as radiation contaminated sites within Zone 1 or Zone 2 of a community waterworks source. Refer to EPA website for the Priority List.
5. Leaking landfills in Zone 1 of a community waterworks source - Existence of leaking landfills should be identified through contacts with the DEQ field offices. A review of historical beta particle activity data for waterworks with a leaking landfill within Zone 1 of any of its sources along with geology and other site-specific information should be considered in making the final

vulnerability determination for these sites. Since Virginia does not have a radionuclides disposal site, this problem is not anticipated.

Evaluation criteria for determination of a waterworks source contaminated by beta particle and photon emitters.

1. Identified contamination - A facility which handles significant quantities of beta particle and photon emitters within Zone 1 or Zone 2 of a community waterworks source poses a possible source of contamination. Review the NRC facilities list (mentioned in the previous section of this memo) to verify that no listed facilities are located within these zones. Follow-up with DEQ and EPA if necessary.
2. Historical Data – Gross beta activity is routinely monitored by DCLS as part of the radionuclide analyses required for all community waterworks. Gross beta activity (less the contribution from potassium) higher than the vulnerability screening level (50 pCi/L) may indicate vulnerability or contamination from man-made sources not otherwise identified. Further investigation should be conducted for waterworks with a source water gross beta activity greater than the screening level to determine if previously unidentified manmade contamination of the source water exists. Follow-up with DEQ, and EPA, for verification assistance.

All community waterworks must be informed of the results of this vulnerability/contaminated source determination. A form letter that may be used to notify community waterworks owners of sources that have been determined by VDH to be vulnerable to beta particle and photon emitters is provided as Attachment 1. A similar letter could be used, if necessary, to notify an owner designated as having source water contaminated by beta particle and photon emitters. Attachment 2 is a form letter to notify all Community waterworks owners of sources which have been determined by VDH not to be vulnerable to this type of contamination. Also, the results for each source water determination for community waterworks must be recorded in the R and R database when the notification letter is mailed.

CCR Reporting

Where gross beta particle activity and photon emitters are required to be monitored and the owner is required to calculate an annual dose equivalent to the total body or any internal organ (in mrem/year) to determine compliance, then the dose equivalent level should be reported in the CCR.

ATTACHMENT 1

**Waterworks Owner Notification Form Letter for Designation as Vulnerable To Beta Particle and Photon
Emitter Radioactivity**

SUBJECT:
Water –
PWSID No.:

Date

Waterworks Owner

Address 1

Address 2

City, State, Zip

Dear *Waterworks Owner*:

As part of our review process for source water vulnerability to manmade radionuclides referenced in the *Waterworks Regulations*, we have determined that your waterworks entry point [] is vulnerable to manmade beta particle and photon emitter radioactivity. This determination of vulnerability is based in part on the location of the [nuclear material handling facility] within _____ [ft/miles] of [waterworks source].

The *Waterworks Regulations* require that owners of community waterworks designated as vulnerable must sample for beta particle and photon radioactivity. Entry point samples must be collected quarterly for beta emitters and annually for tritium and strontium-90 within one quarter after notification. Therefore, you must begin sampling no later than the quarter of [] with the results reported to us. We may reduce your monitoring frequency after one year (four quarters of gross beta sampling) depending on the sample results.

Samples must be collected in an approved manner and analyzed by a laboratory approved by the Division of Consolidated Laboratory Services (DCLS) for the specific radionuclides to be tested. Not all laboratories listed under the general category of radionuclides on the DCLS approved list of drinking water labs have the capability or certification to perform all tests required by this vulnerability designation. Please confirm that the laboratory you are considering has capability and certification to perform the required drinking water analyses before initiating your sampling program.

If you have any questions regarding your responsibilities for waterworks monitoring described above, please contact me.

Sincerely,

District Engineer

cc: Local Health Department, Attn: _____, Director

ATTACHMENT 2

Waterworks Owner Notification Form Letter for Sources Not Vulnerable To/Contaminated By Beta
Particle and Photon Emitter Radioactivity

SUBJECT:
Water –
PWSID No.:

Date

Waterworks Owner

Address 1

Address 2

City, State, Zip

Dear *Waterworks Owner*:

As part of our review process for source water vulnerability to manmade radionuclides referenced in the *Waterworks Regulations*, we have determined that your waterworks entry point [] is not vulnerable to or contaminated by manmade beta particle and photon emitter radioactivity. This determination is based in part on existing radiological results and the location of the nuclear material handling facilities within the Commonwealth of Virginia. Therefore, you are not required to monitor your entry point(s) for manmade beta particle and photon emitters radioactivity at this time.

If you have any questions regarding the vulnerability of your entry points to contamination by manmade beta particle and photon emitter radioactivity, please contact me.

Sincerely,

District Engineer

cc: Local Health Department, Attn: _____, Director